CONFERENCE ON DISARMAMENT

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Federal Republic of Germany

Report on the second trial inspection (challenge inspection) in the Federal Republic of Germany

Summary

At an earlier trial challenge inspection in an ammunition depot, the main emphasis had been on the significance of secondary indicators (see CD/CW/WP.278). The second trial inspection conducted in November 1989 on that basis served the principal purpose of obtaining for the first time data on the use of instruments under practical conditions. To this end, a military site with operational units was selected as a considerably more complex item for inspection.

It was demonstrated that, with the aid of random on-site checks and the use of currently available portable/transportable ultrasonics, radiography and mass spectrometry equipment, it is possible to dispel with adequate certainty the suspicion that chemical weapons are being produced or stockpiled, without sensitive information having to be disclosed.

However, depending on the number of samples and test items, the careful application of the procedures and equipment and the evaluation of the measurements may take more than 24 hours. Consequently, more efficient equipment and methods should be developed to meet the specific time requirements of a challenge inspection. In this respect, the United Kingdom's working paper of 12 January 1990 (CD/CW/WP.269) offers interesting ideas.

1. Aims

The main objective of the trial inspection, carried out on the basis of an unspecified suspicion of chemical weapons production or stockpiling, was to find concrete answers to the following questions through the practical use of instruments:

- Are the currently available ultrasonic or radiographical methods suitable for on-site, non-destructive categorization of ammunition?

- How many samples and what kind of samples can be adequately categorized on site with the aid of the mobile mass spectrometer?

- How much time is needed?

- Are three inspection assistants sufficient for the proper and efficient use of the instruments?

Furthermore, from the viewpoint of maintaining secrecy, the inspection was expected to clarify the question as to what extent the observer from the challenging country can be granted access.

2. Facilities inspected

The trial inspection concerned a military site where field artillery and NBC defence battalions are stationed. Two facilities were inspected:

- the joint barracks complex covering approx. 23 hectares and comprising an accommodation and medical area, a technical area with workshops and storage buildings, a training area, a heating station and heating oil store, a fuel store, open spaces with parked vehicles and diverse equipment;

- the associated ammunition storage site approx. 7 km away, which covers approx. 39 hectares and consists of ammunition

bunkers, equipment stores, workshops, administrative buildings and guard houses.

In keeping with its mission, the NBC defence battalion possesses special decontamination equipment, such as vehicles with tank superstructure and spraying device, stocks of chemical decontaminants and protective suits, as well as special equipment for the detection of chemical weapons.

3. Inspection team, observer, escort

The reinforced inspection team consisted of eight persons:

- two chemical weapons specialists responsible for the actual inspection activities,

- one expert on the forces inspected,

- two security experts responsible for checking the security measures of the unit inspected,

- three technical inspectors for carrying out checks with test and analysis equipment.

The team was accompanied by one officer acting as observer of the challenging country and by an in-country escort.

4. The inspection proper

The trial inspection, which was planned to last 24 hours, began with the arrival of the team at the facility to be inspected. After a short briefing, the inspectors asked questions, many of which were only answered after consultation with the in-country escort. This subsequently led to far-reaching demands by the inspectors.

Throughout the inspection, the observer made use of his right to suggest specific checks to the inspection team. He was given the same access and information as the inspectors. A restriction of his activities occurred when the inspection team

was temporarily divided into two groups in order to carry out parallel checks at different points. The observer was free to choose where to take part. For the sake of an efficient inspection, the team refused to carry out all checks one after another merely so that the observer would be able to observe all inspection activities.

During the random checking of the accommodation, administrative, medical and technical areas, the inspectors were permitted to examine the relevant files and regulations and to take samples from diverse containers for immediate analysis. Some ammunition and chemical bunkers and stores where selected for closer examination, the choice being made either arbitrarily or on the basis of hazard class markings.

For the physical determination of the contents of ammunition and containers without opening them or taking samples, use was made of an ultrasonic wall thickness tester, an electrostethoscope and radiographic equipment.

For the qualitative chemical categorization of chemicals found, a mass spectrometer was employed.

4.1 Physical examinations

When examining ammunition, the emphasis lay on ruling out any liquid chemical charges and distinguishing it from explosive ammunition.

The ultrasonic wall thickness tester was used to measure the wall thickness of ammunition. Since chemical warfare ammunition usually has thinner walls than explosive ammunition, such measurements permit conclusions to be drawn in this respect. These measurements were also needed to ascertain the correct exposure time for radiography.

The likewise portable electrostethoscope served to determine the presence of fluids. When ammunition is subjected to kinetic stress, the electrostethoscope permits the typical noise of the moving liquid to be detected. The sound waves generated are

picked up by a piezoelectric element, amplified and heard via a headset, provided that the probe of the stethoscope is in direct contact with the item to be examined. Radiography involving X-rays for the non-destructive examination of the internal technical structure was used to identify specific features of chemical warfare ammunition. The transportable X-ray unit (min. 300 keV energy) employed for this purpose requires a 220 V power supply, which was locally available. The exposed film material was developed in a nearby hospital.

4.2 Analysis of samples

A mobile mass spectrometer (MM1) installed in a vehicle was available for sample analysis. The instrument programmed for the detection of chemical warfare agents through selected ion monitoring (SIM) was, with the approval of the in-country escort, also employed for more intrusive examination of samples through the recording of partial spectra within relevant mass ranges and of spectral series. To confirm the identity of chemicals found, the samples taken were first checked by SIM for the absence of chemical warfare agents listed in schedule 1. Then they were identified on the basis of spectral series after being subjected to coarse separation both through fractional evaporation and through chromatographic effects in the diaphragm inlet system used.

The chemicals analyzed included perchloroethylene, ethanol, fuels and CS, which is used both for exercises and for testing of the tightness of gas masks.

For the examination of complex air and coating samples, it would have been necessary to convert the instrument and replace the inlet system by a gas chromatograph for greater sensitivity and selectivity. This was dispensed with for reasons of time.

5. Conclusions

The selected test and analysis equipment of the present state of the art can be successfully used for a challenge inspection. The considerable time still needed can be appreciably reduced

by increasing the number of instruments and of technical staff, by further routine in carrying out the examinations and by refining the processes and equipment, which should be specifically tailored to the time requirements of challenge inspections.

A challenge inspection, with respect to the use of test and analysis equipment, can generally be carried out all the more easily, the more precisely the suspicion giving rise to the challenge is described.

Even at this stage it is possible to ascertain the identification of relevant chemicals quickly, reliably and on the spot. A sample throughput of ten to twenty an hour can be achieved.

Careful examination of complex trace samples needs far more time. Even the taking and preparation of samples in this respect requires a lengthy period. Confinement to a few, carefully selected samples is therefore necessary.

Additional chemical screening procedures with a detection kit similar to that presented in the Netherlands working paper CD/CW/WP.271 can be used to advantage in this connection in order to select samples suitable for more extensive mass spectrometry.

In the present case, the inspection team did not have sufficient staff to develop an adequate basis of data within 24 hours.

In a future trial inspection a so-called "Gammamat" should be used for the radiographical examination of munitions involving gamma rays. This transportable unit, being independent on an external power supply, is expected to permit versatile operation even in confined spaces and the investigation of several items at the same time, thus improving the efficiency of the investigation to a considerable extent.

The trial inspection showed that it was possible to protect sensitive data and facilities, which exist at this site only in a limited number, even though the observer played a very active and challenging role, maintained a constant dialogue with the inspection team and enjoyed the same access as the team. It is not yet possible to generalize these results, because some military installations have far more sensitive data and facilities than the site inspected.

CONFERENCE ON DISARMAMENT

CD/CW/WP.284
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FEDERAL REPUBLIC OF GERMANY

Ad hoc Verification: The Establishment of National Registers

In presenting its concept of ad hoc checks the delegation of the Federal Republic of Germany proposed the establishment of National Registers listing all relevant facilities of the chemical industry (cf. CD/869 of 6 September 1988). These registers to be provided by States parties to the Technical Secretariat were to serve as the basis for the selection of facilities to be inspected by ad hoc checks.

Detailed discussions on a possible ad hoc verification régime have subsequently taken place in Working Group 1 of the Ad hoc Committee on Chemical Weapons in the course of the spring part of the 1989 session of the Conference on Disarmament. These discussions also focused on the issue of National Registers and showed the need to further explore the conceptual approach to be taken in this regard.

With a view to providing a basis for further discussion the following concept of National Registers is suggested:

1. Purpose

National registers are to serve two purposes:

- First, National Registers will constitute a confidence-building measure as they are listing all relevant plant sites of the chemical industry world wide according to an agreed format.

- Second, National Registers will provide the declaration basis for the selection of facilities to be inspected by ad hoc verification measures.

The following discussion of the issue focusses solely on the latter purpose.

2. General considerations concerning National Registers as the declaration basis for ad hoc verification

Ad hoc verification measures are a complementary instrument their sole purpose being to verify on a routine basis whether, at the time of the check, substances listed in the Annex on Chemicals and not declared for facilities at the plantsite are being produced. As such they require - as the other routine verification measures of the Convention - a reliable declaration basis.

As National Registers are to serve this purpose, they have to be binding: In its National Register a State Party formally declares all relevant facilities of its chemical industry which will be subject to ad hoc verification measures.

Omissions and false information in the National Register will thus have to be considered as violations of declaration obligations. This notwithstanding it is understood that - in particular during the first years after the entry into force of the Convention - National Registers provided by States Parties may contain inaccuracies and unintentional omissions which will be due to technical difficulties in registering all relevant plantsites within a State in accordance with the proposed format. It is to be expected that also the other declaration obligations under Article VI might present some teething troubles, but that those will soon be overcome. Initial inaccuracies in National Registers will thus certainly not be considered serious breaches unless they prove to be intentional.

3. Requirements for National Registers

National Registers must be tailored to the purposes and needs of the inspection measure for which they provide the declaration basis. As ad hoc verification measures are to address the problem posed by the fact that existing facilities of the chemical industry can be misused for producing chemical weapons, National Registers are to provide a comprehensive picture of the relevant parts of the chemical industry. They have to list all facilities which can possibly be misused for the production of chemical weapons. As such a capability is hard to define unambiguously it is suggested that a broad approach be adopted. For this approach to be feasible and acceptable it has to be easily implementable by States Parties and at the same time it has to be ensured that confidential information is protected.

4. Suggested modalities for establishing National Registers

In order to meet the requirements described above the following approach to the establishment of National Registers is suggested:

- Each State Party shall provide to the Organization a National Register of its chemical industry.

- This register shall include all plantsites which produce discrete chemical compounds through technical processes based on chemical reaction(s), the total annual amount of this production exceeding [10] tonnes.

- Those plantsites which exclusively produce iron smelting products, cement, glass, ceramics shall not be subject to declaration (1).

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(1) Whether additional production areas are to be exempted from the declaration obligation needs further consideration.

Underlying the approach outlined in the three elements above is the basic criterion that only those plantsites shall be declared in the National Register that perform chemical reaction(s). For this purpose chemical reaction is defined as any transformation of chemicals where rearrangements of atoms, groups of atoms, ions or radicals of one or more substances (called basic or raw materials) result in the formation of new substances. Not included are physical processes such as crystallization, extraction, etc. Also not included are product formulation and mechanical processing of chemicals (2).

The plantsite is suggested to be the basic unit of registration in National Registers. The definition of this term as well as definitions of other pertinent organizational entities/structures in the chemical industry are set out in the Annex to this Working Paper.

5. Contents of the National Register

In order to enable a meaningful selection of plantsites to be inspected by ad hoc verification measures the National Registers should include information according to an agreed format. It is proposed that they include at least the following items:

- name of the plantsite and the owner, company or enterprise operating it,

- exact location of each plantsite

- main orientation of each plantsite

(2) As biochemical processes pose quite distinct verification problems, toxins are left out of consideration in

- principal product groups (3) of each plantsite.

- size of overall annual production for each product group within ranges (10 to 100 tonnes, 100 to 1000 tonnes, 1000 to 10 000 tonnes, 10000 to 100 000 tonnes, above 100 000 tonnes).

6. Submission of National Registers

National Registers should be submitted by all States Parties [6] months after the entry into force of the Convention. Information to be provided under para. 5 should be updated annually at a fixed date (only changes as compared with the previous declaration to be reported).

7. National Registers and the conduct of ad hoc verification measures

Due to their non-intrusive character ad hoc verification measures provide for the possiblity of verifying a large number of facilities of a plantsite within a relatively short period of time. However, even if the plantsite is chosen as the basic unit of registration in the National Register, not all production facilities of a plantsite receiving an inspection in accordance with an ad hoc verification regime would be checked. Rather it could be envisaged that the inspection team, upon arrival at the site, would select one or more particular production facilities to be checked. In this way equality of obligations undertaken can be ensured (cf. different sizes of plantsites in different countries).

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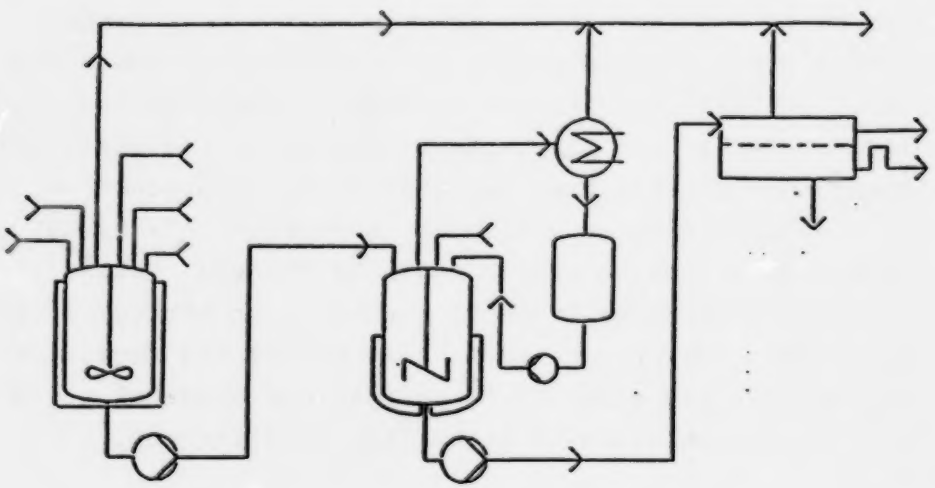
(3) Product groups could be pesticides, pharmaceuticals, dyes, pigments, etc. It needs to be discussed further what the categorization should look like also with regard to the requirement that the most relevant production/plantsites should be easily identifiable. In this regard it may e.g. be necessary to have "organophosphorous pesticides" as a separate product group.

A N N E X

The Definition of Facilities of the Chemical Industry

1. PLANT SECTION

A plant section for the manufacture of a chemical product ("product") is the means for operating individual process steps such as reaction, work-up, purification, etc. A process step can technically consist of



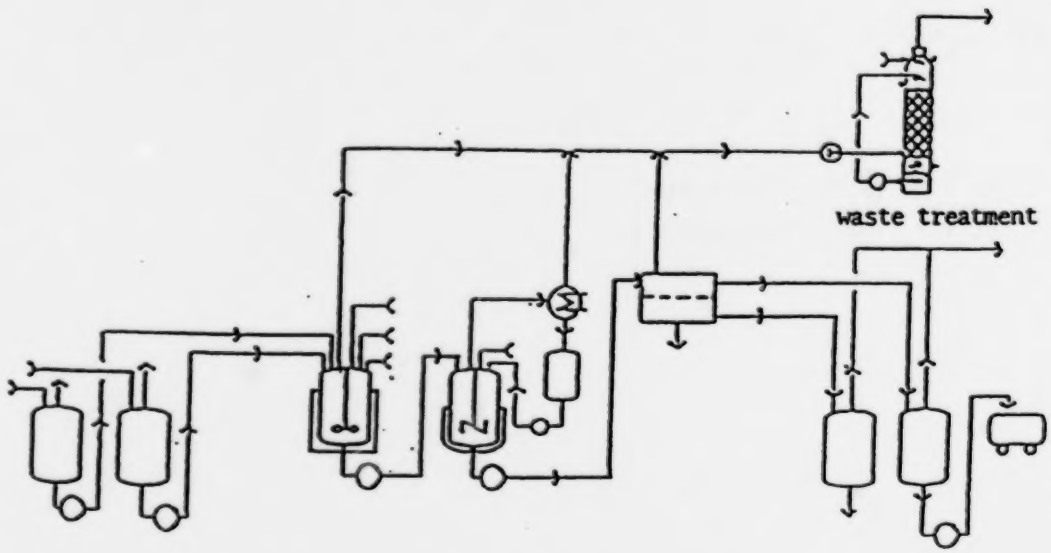
reaction work-up

several basic unit operations, i.e. the process step of purification can consist of the three unit operations crystallization, isolation and drying.

2. PRODUCTION PLANT

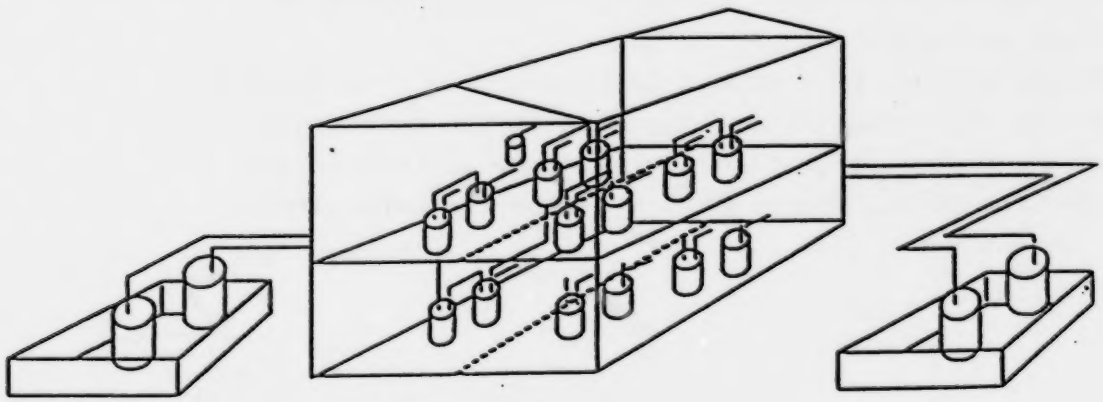
A production plant incorporates all necessary plant sections for the manufacture of a product such as reaction, work-up and purification. Also included are all necessary installations and equipment for process monitoring and control, tankfarm for raw materials, intermediates and final products and specific equipment for waste treatment.
Often the name of the product is used to identify a production plant, e.g. dialkylamin plant. Central installations serving several production plants such as central cooling systems and waste treatment, are not included in the definition of a production plant.

One main product or simultaneously several main products, resulting from one main reaction, can be produced in a production plant.
A different main product can be produced in a production plant by utilizing all or only some of the existing plant sections or by integrating new plant sections into the production plant. The reactions can be run batchwise or continuously.



3. PRODUCTION FACILITY

A production facility consists of independent or interrelated production plants including the necessary auxiliary plant, which are physically integrated in a production building or in an open steel structure.
The production plants, with regard to their products, can be operated independently, but have certain plant sections in common, such as specific waste treatment and tankfarms. They can also be linked in order to produce one final product.

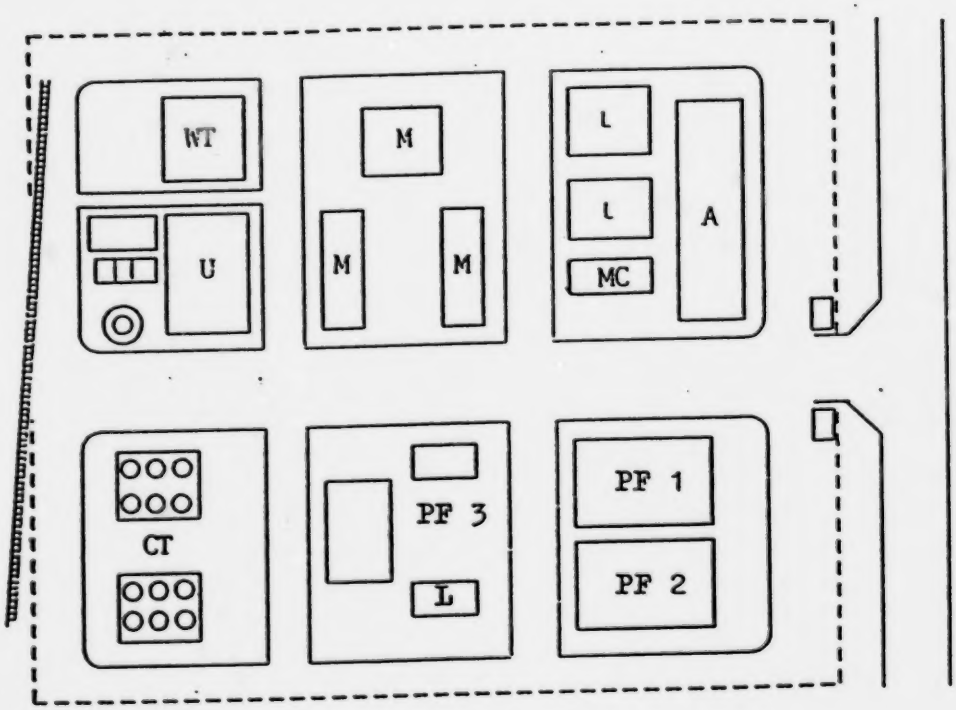


PP 1 PP 2

PP 1 = production plant 1
PP 2 = production plant 2

4. PLANTSITE

A plantsite is the local integration of one or more production facilities together with infrastructure, like maintenance shops, administration, medical center, central waste treatment plants and utility supplies.



PF 1 = production facility 1
PF 2 = production facility 2
PF 3 = production facility 3
M = maintenance shop
A = administration
MC = medical center
U = utility supply
WT = waste treatment
CT = central tankfarm
L = laboratories